

Amendments to the Claims:

1. (Currently amended) An integrated fan pump A cooling apparatus comprising:
a fan;
a pump, said pump configured adapted to transfer a coolant from at least one a coolant inlet to at least one a coolant outlet, an external geometry of said pump adapted to be sufficiently compact such that gas flow through said fan and said pump is substantially unimpeded by said pump, said gas flow moving from a gas flow inlet in a substantially straight, unchanged direction to a gas flow outlet; and
an electrical drive mechanism configured to simultaneously drive said fan and said pump, wherein said electrical drive mechanism has a rotational rate in the range of 2000 to 3000 rpm and said pump has a pump flow rate in the range of 5 cc/sec to 10 cc/sec.
2. (Currently amended) The apparatus of claim 1, further comprising a heat exchanger coupled to an expansion tank, wherein said expansion tank is coupled to said coolant inlet of said pump, said heat exchanger is coupled to a heat source, and said coolant outlet of said pump is coupled to said heat source to provide cooling thereof.
3. (Currently amended) The apparatus of claim 1, further comprising a heat exchanger coupled to said coolant outlet of said pump and an expansion tank coupled to said coolant inlet of said pump, wherein said heat exchanger and said expansion tank are coupled to a heat source to provide cooling thereof.

4. (Cancelled)

5. (Original) The apparatus of claim 1, wherein said drive mechanism comprises an electric motor configured to rotate said fan and said pump with respect to a housing.

6. (Currently amended) The apparatus of claim 5, wherein: said fan includes a fan head coupled to a fan propeller; said pump includes a pump head coupled to a pump impeller; and said fan head and said pump head are attached to a common axle, said fan, pump and common axle rotating together with respect to a housing.

7. (Original) The apparatus of claim 6, wherein said electric motor comprises a magnetic coil fixed to said housing and a magnet fixed to said fan head.

8. (Original) The apparatus of claim 6, wherein said fan propeller is selected from the group consisting of axial, tubeaxial, centrifugal, crossflow, backward-curved, forward-curved, airfoil, turbine, and straight radial.

9. (Original) The apparatus of claim 6, wherein said pump impeller is selected from the group consisting of axial propeller blade, straight radial blade, centrifugal blade, backward-curved blade, forward-curved blade, and turbine blade.

10. (Original) The apparatus of claim 6, wherein said axle comprises a first axle segment coupled to said fan head and a

second axle segment coupled to said pump head, and wherein said first and second axle segments are coupled via a mechanical coupling.

11. (Currently amended) The apparatus of claim 5 6, wherein: said fan includes a fan head coupled to a fan propeller; said pump includes a pump head coupled to a pump impeller; and said fan head and said pump head are configured to rotate about a common axle that is fixed to said housing.

12. (Original) The apparatus of claim 11, wherein said electric motor comprises a magnetic coil fixed to said housing, a first magnet fixed to said fan head, and a second magnet fixed to said pump head.

13. (Original) The apparatus of claim 11, wherein said first magnet and said second magnet are substantially coaxial toroidal magnets having said magnetic coil fixed therebetween.

14. (Original) The apparatus of claim 13, wherein said first magnet and said second magnet are substantially disc-shaped magnets having said magnetic coil fixed therebetween.

15. (Original) The apparatus of claim 11, wherein said fan propeller is selected from the group consisting of axial, tubeaxial, centrifugal, crossflow, backward-curved, forward-curved, airfoil, turbine, and straight radial.

16. (Original) The apparatus of claim 11, wherein said pump impeller is selected from the group consisting of axial

propeller blade, straight radial blade, centrifugal blade, backward-curved blade, forward-curved blade and turbine blade.

17. (Original) The apparatus of claim 11, wherein said axle comprises a first axle segment coupled to said fan head and a second axle segment coupled to said pump head, and wherein said first and second axle segments are coupled via a mechanical coupling.

18. (Currently amended) The apparatus of claim 5 ~~6~~, wherein said electric motor is a DC brushless motor.

19. (Currently amended) The apparatus of claim 5 ~~6~~, wherein said electric motor is a DC brush type motor.

20. (Currently amended) The apparatus of claim 5 ~~6~~, wherein said electric motor is an AC motor.

21. (Currently amended) An integrated fan pump configured to provide cooling of a component, said fan pump comprising:
a housing;
a fan having a fan head coupled to a fan propeller;
a pump having a pump head coupled to a pump impeller, said pump ~~configured~~ adapted to transfer a coolant from at least one coolant inlet to at least one coolant outlet, said pump positioned entirely outside a gas flow region of said fan such that gas flow through said fan and said pump is substantially unimpeded by said pump, said gas flow moving from a gas flow inlet in a substantially straight, unchanged direction to a gas flow outlet;

a heat exchanger coupled to said outlet of said pump and thermally communicating with the component; and

an electrical motor configured to simultaneously rotate said fan and said pump with respect to said housing.

22. (Original) The integrated fan pump of claim 21, wherein said fan head and said pump head are attached to a common axle, and wherein said electrical motor comprises a magnet fixed to said fan head.

23. (Original) The integrated fan pump of claim 21, wherein said fan head and said pump head are configured to rotate about a common axle that is coupled to said housing, and wherein said electrical motor comprises a first magnet fixed to said fan head and a second magnet fixed to said pump head.

24. (New) A method of manufacturing an integrated fan pump, comprising:

providing a fan;

providing a pump adapted to transfer a coolant from a coolant inlet to a coolant outlet, said pump positioned entirely outside a gas flow region of the fan such that gas flow through said fan and said pump is substantially unimpeded by said pump, said gas flow moving from a gas flow inlet in a substantially straight, unchanged direction to a gas flow outlet; and

providing an electrical drive mechanism configured to simultaneously drive said fan and said pump.

25. (New) The method of manufacture of claim 24, further comprising providing a heat exchanger coupled to an expansion

tank, wherein said expansion tank is coupled to said coolant inlet of the pump, said heat exchanger is coupled to a heat source, and said coolant outlet of the pump is coupled to said heat source to provide cooling thereof.

26. (New) The method of manufacture of claim 24, further comprising providing a heat exchanger coupled to said coolant outlet of the pump and an expansion tank coupled to said coolant inlet of the pump, wherein said heat exchanger and said expansion tank are coupled to a heat source to provide cooling thereof.

27. (New) The method of manufacture of claim 24, wherein said drive mechanism comprises an electric motor configured to rotate said fan and said pump with respect to a housing.

28. (New) The method of manufacture of claim 27, wherein:
said fan includes a fan head coupled to a fan propeller;
said pump includes a pump head coupled to a pump impeller;
and
said fan head and said pump head are attached to a common axle, said fan, pump and common axle rotating together with respect to a housing.

29. (New) The integrated fan pump of claim 2, wherein said heat exchanger is directly mounted to a surface of said fan.

30. (New) The integrated fan pump of claim 3, wherein said heat exchanger is directly mounted to a surface of said fan.

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31. (New) The integrated fan pump of claim 21, wherein said heat exchanger is directly mounted to a surface of said fan.

32. (New) The method of manufacture of claim 25, wherein said heat exchanger is directly mounted to a surface of said fan.

33. (New) The method of manufacture of claim 26, wherein said heat exchanger is directly mounted to a surface of said fan.